Claims

1. A motor drive control device that controls a motor having three or more phases, characterized by comprising:

a vector control phase command value calculating unit that calculates phase current command values of the respective phases of the motor using vector control;

a motor current detecting circuit that detects motor phase currents of the respective phases of the motor; and

a current control unit that controls phase currents of the motor on the basis of the phase current command values and the motor phase currents.

2. A motor drive control device according to claim 1, wherein the vector control phase command value calculating unit includes:

a counter-electromotive force of each phase calculating unit that calculates a counter-electromotive force of each phase;

a d-q voltage calculating unit that calculates voltages ed and eq, which are d-axis and q-axis components of a counter-electromotive force, from the counter-electromotive force of each phase;

a q-axis command current calculating unit that calculates a current command value Iqref, which is a q-axis

component of a current command value, from the voltages ed and eq;

a d-axis command current calculating unit that calculates a current command value Idref that is a d-axis component of a current command value; and

an each-phase current command calculating unit that calculates phase current command values of the respective phases from the current command values Iqref and Idref.

3. A motor drive control device according to claim 2, wherein, when the motor has three phases, phase current command values Iavref, Ibvref, and Icvref are calculated according to a constant depending on the current command values Idref and Iqref and a rotation angle θe of the motor.

4. A motor drive control device according to claim 1, wherein the current control unit includes integral control.

5. A motor drive control device according to any one of claims 1 to 4, wherein the motor is a brushless DC motor.

6. A motor drive control device according to any one of claims 1 to 5, wherein a current waveform or an induced voltage of the motor is a rectangular wave or a pseudo-rectangular wave.

7. An electric power steering device, wherein the motor drive control device according to any one of claims 1 to 6 is used.

8. A motor drive control device that controls a current of a motor on the basis of current command values Idref and Iqref, which are calculated using vector control, characterized in that, when a detected mechanical angular velocity ωm of the motor is higher than a base angular velocity ωb of the motor, the current command value Idref is calculated according to a torque command value Tref of the motor, the base angular velocity ωb, and the mechanical angular velocity ωm.

9. A motor drive control device according to claim 8, wherein the current command value Idref is calculated according to the torque command value Tref and a function of $\sin\Phi$ and an advance angle Φ is derived from the base angular velocity ωb and the mechanical angular velocity ωm.

10. A motor drive control device according to claim 8 or 9, wherein the current command value Iqref is calculated by substituting the current command value Idref in a motor output equation.

11. A motor drive control device according to any one of

claims 8 to 10, wherein the motor is a brushless DC motor having three or more phases.

12. A motor drive control device according to claim 11, wherein a current waveform or an induced voltage of the brushless DC motor is a rectangular wave or a pseudo-rectangular wave.

13. An electric power steering device, wherein the motor drive control device according to any one of claims 8 to 12 is used.

14. A motor, characterized in that, when an induced voltage waveform of the motor is a rectangular wave or a pseudo-rectangular wave and an order wave component at the time when the rectangular waveform or the pseudo-rectangular waveform is subjected to frequency analysis is assumed to be n (=2, 3, 4, ...), the order wave component n equal to or larger than 5% of an amplitude component is set to satisfy the following inequality:

$n \times P/2 \times \omega \leq$ an upper limit value of a response frequency of current control

where P is the number of poles and ω is the number of actual rotation.

15. A motor according to claim 14, wherein the motor includes an angle sensor and gives a current waveform at least as a function of an induced voltage waveform of the rectangular wave or the pseudo-rectangular wave.

16. A motor according to claim 14, wherein an electric time constant of motor correlation is equal to or larger than a control period.

17. A motor according to claim 14, wherein the motor includes an angle estimating unit and gives a motor current waveform as an estimated angle from the angle estimating unit.

18. A motor according to claim 14, wherein an upper limit value of a response frequency of the current control is 1000 Hz.